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Exploring staff Diabetes medication knowledge and practices in Australian regional residential care: triangulation study.

Abstract -

Aims and objectives: This paper is drawn from a larger project that aimed to identify the staffing and organisational factors influencing the quality of diabetes care for older people living in residential care in regional Victoria, Australia. The focus of the current paper is on medication management for residents with diabetes.

Background: With a continuous rise in diabetes in the population there is an associated increase in the prevalence of diabetes in aged care residential settings. However, there is little specific guidance on how to manage diabetes in older people living in institutional settings who experience multiple concurrent chronic conditions.

Design: A triangulation strategy consisting of three phases.

Methods: A one shot cross-sectional survey (n 68), focus group interviews and a case file audit (n 20). Data were collected between May 2009 – January 2010.

Findings: Staff knowledge of diabetes and its contemporary medication management was found to be suboptimal. Challenges to managing residents with diabetes included limited time, resident characteristics and communication systems. Additionally the variability in medical support available to residents and a high level of polypharmacy added to the complexity of medication management of resident.

Conclusions: The current study suggests administering medicine to residents in aged care settings is difficult, and has potentially serious medical, professional and economic consequences. Limitations to staff knowledge of contemporary diabetes care and medications, potentially places residents with diabetes at risk of receiving less than optimal diabetes care.

Relevance to clinical practice: Providing evidence based guidelines about diabetes care in residential care settings is essential to achieve acceptable outcomes and increase the quality of life for residents in public aged care. Continuing education programs in diabetes

care, specifically related to medication must be provided to all health professionals and encompass scope of practice.

Key words: diabetes; aged; residential facilities; medication systems

Introduction

Diabetes is a major international health issue with increasing prevalence in older people (Shaw 2010). In Australia, approximately 7.2% of the population has been diagnosed with diabetes (Shaw, 2010). The prevalence of diabetes in Australia has more than doubled between 1989-90 and 2007-08 with the number of people reported to have diabetes increasing to 898,800 (Australian Institute of Health and Welfare 2009, Australian Institute of Health and Welfare 2011). The substantial increase was attributed to more people developing the disease, improved detection of the disease and people with diabetes living longer.

Studies in the US also reflect a high prevalence of diabetes: approximately 20 million Americans have diabetes (Gambert & Pinkstaff 2006). The chances of being diagnosed with diabetes increases with age; more than half of those with diabetes in the US are over 60 years of age. The highest prevalence is in the over 80 years of age group (Centers for Disease Control and Prevention 2011). Similar trends have been identified in both the UK and Australia. Studies in the UK indicate there is a high prevalence of people with diabetes in nursing homes and routine screening detected up to 25% of residents with undiagnosed diabetes (Aspray *et al.* 2006, Gadsby *et al.* 2011).

The Australian population is ageing with the proportion of older Australians (over 65 years) is expected to reach 13% of the whole population (3.8 million in year 2016) (Australian Institute of Health and Welfare 2007). In the last decade, the growth rate in the population aged 65 years and over has been fairly constant at about 2% each year. Among the population who

are most likely to need and use aged care services (those aged 85 years and over) the rate of growth has been considerably higher (between 3% and 7% each year). Between 1998 and 2008, the number of people in the over 85 year age group increased by 61% (Australian Institute Health and Welfare 2007). Growth in the very old population will generate greatly increased government spending on aged care, as projections in Australia estimate that the number of people aged 85 years and over may increase in the next 50 years to 1.8 million people, or 5% of the total population.

Diabetes represents a significant health burden for older people and their formal and informal care providers (Sinclair 2011). The prevalence of diabetes and impaired glucose tolerance is high among older people in Australian regional and rural settings. For example, recent data suggests diabetes in people aged over 70 in regional Victoria is growing faster than the national average (21.05%). In Ballarat, an inland regional centre, 23.74% of people over 70 have diagnosed diabetes and Geelong, a regional coastal centre, has a similar rate (23.61%) (Australian Diabetes Map 2008).

Optimal diabetes management is complicated in older people by age-related physical and cognitive changes and the presence of co-existing co-morbidities. Diabetes-related neuropathic and vascular complications also contribute to increased risk of injuries, falls and medicine-related adverse events in older people. Short term hypoglycaemia and hyperglycaemia affect mood, cognitive functioning and self-care ability.

Residential Aged Care in Australia

Diabetes management is complicated in residential aged care facilities (RACF). Although guidelines for elder care exist (Australian Diabetes Educators Association 2003) they relate to community dwelling elders and do not address the complexity of care required in institutional settings. The current guidelines focus on metabolic targets and do not acknowledge that diabetes in older people presents a wide range of additional complexities,

especially for those living in residential aged care facilities. It is vital for resident safety that RACF staff have the knowledge to understand the critical relationship between medication and its effect on metabolic function and act appropriately on metabolic data.

In Australian RACF the current workforce consists of a mix of registered nurses (RN), enrolled nurses (EN) with and without medication endorsement (added competence to administer medications) and unregulated care workers, commonly known as patient care attendants (PCA). The skill mix varies between private and government funded RACFs and on the designated level of care residents require: high or low level care. Residents designated as needing low level care generally require some assistance with activities of daily living but maintain a level of independence. Residents with diabetes often need assistance with injecting insulin, which is a high risk medicine. Residents requiring high level care depend on nurses and PCAs for their hygiene, nutrition and health care, including medicine management. Sub-optimal glycaemic control can have significant adverse outcomes for residents with diabetes such as electrolyte abnormalities, infection, and increased cognitive dysfunction (Tessier 2011).

Aim of the paper

This paper is drawn from a larger project that aimed to identify the staffing and organisational factors influencing the quality of diabetes care for older people living in RACF managed by two regional health services in the state of Victoria in Australia. The focus of the current paper is on medication management for residents with diabetes living in RACF.

Methods

A triangulation strategy consisting of three phases: a one shot cross-sectional survey, focus group interviews and a case file audit was used. Data were collected between May 2009 – January 2010.

Sampling population

The sampling population consisted of two government (public) RACFs in regional Victoria, Australia. Both organisations offer a comprehensive range of health services to their regions, which include high and low residential aged care. Organisation A operates 476 residential care beds distributed across several geographic settings. It is located in an inland city with a population of approximately 90,000. Organisation B operates 411 residential beds with less geographic distribution and is located in a coastal city with a population of approximately 198,000 (Australian Bureau of Statistics 2006). Both organisations service the surrounding rural districts.

Sampling procedure

All resident care staff employed in each health service in high or low residential aged care as RNs, ENs or PCAs were invited to participate. Managers of appropriate units distributed an information package to eligible staff. The package contained a Participant Information Form, questionnaire, a reply paid envelope addressed for returning the questionnaire, an invitation to participate in a focus group, a form indicating interest in participating in a focus group and separate reply paid envelope to return the acceptance to be in a focus group.

Staff at each RACF identified a random sample of residents with diabetes, stratified by high/low care. Managers in the facilities introduced members of the research team to the residents. The team explained the project aims and gave potential participants a Participant Information Form. Residents were asked to sign a consent form if they were prepared to allow their records to be included in the case file audit.

Survey

A total of 540 questionnaires were distributed to staff across all the clinical areas with a request to use reply paid envelopes provided or deposit responses in local secure collection boxes.

The Questionnaire

The Australian version of the Audit of Diabetes Knowledge (ADKnowl) (Bradley 2003) was used to assess diabetes knowledge. The ADKnowl includes 27 item-sets (114 items) in eight domains relating to knowledge of diabetes and its treatment. The ADKnowl was developed to assess people with diabetes knowledge of diabetes and was selected for the current study on the basis that health professionals and care workers should at least have the same level of knowledge as the people they provide care for. Response options were true, false or don't know. The questionnaire is an internationally validated instrument that has demonstrated effectiveness for both measuring knowledge of diabetes and its management amongst lay and professional audiences. Although developed in the United Kingdom, an Australian version was used in the study. The Australian version was linguistically tested in the Australian population. Additionally, vignettes related to diabetes care in older people with specific questions were added with Bradley's permission. Respondents were also provided with space for additional qualitative comments.

Focus group Interviews

An invitation to participate in an interview was circulated with the questionnaire. RACF staff were asked to identify their interest by returning a form with their contact details to the researchers who subsequently contacted them and organised the interviews. The interviews aimed to explore barriers to and facilitators of managing diabetes in their relevant RACF. Two investigators (SW and BR) conducted interviews in meeting rooms in the relevant health services .

Case file audit

A subset of case files of the previously randomised group of residents with known diabetes was audited to assess the previous 12 months care received. At each site a registered nurse experienced in diabetes management audited ten resident case files, thus 20 files were

audited (10 from Organisation A and 10 from Organisation B). The audit included files from high and low care settings. The structured audit examined the approach to diabetes management and any incidents that occurred in the previous 12 months. This included but was not limited to glucose monitoring, nutrition, physical activity based on patient's needs/condition, medications, foot examination, blood pressure and weight.

Data analysis processes

Quantitative data from the questionnaire were entered into a database using SPSS 17.0 and descriptive statistical procedures t-test, Mann-Whitney-U-test and Chi-square-Tests (cross-tabulation procedure) were performed to identify relationships among participants' demographic characteristics, qualifications and knowledge, difference between the two health services as well as defined items in the ADKnowl questionnaire. The sum of correct responses for each ADKnowl sub-scale was calculated, and a total score for all ADKnowl items.

Scores for correct responses to items about each vignette were calculated and a total score for responses to all vignette items was calculated. The interviews were audio recorded and transcribed. Field notes were also recorded to capture non-verbal communication during interviews. A qualitative content analysis was performed. Descriptive, interpretative and explanatory codes and categories were systematically defined through the analysis process of the qualitative data. The case files were examined and analysed by using Dunning's framework (Dunning 2005).

Ethical issues

Ethics approval was obtained from the Human Research Ethics Committees at both health services before data collection commenced. All steps to maintain confidentiality were taken in management of data and only de-identified data was used in reports and publications.

Findings

Response rate

Sixty-eight completed surveys were returned (12.5% response rate), which although a low return rate, satisfied the aim of the research and provided a snap shot of current practice in the study settings. Feedback from staff highlighted issues about the perceived difficulty of some of the questions, the intimidating format of the ADKnowl and not wanting to expose their lack of knowledge. Three people volunteered to participate in the focus group interview.

Profile of respondents

The majority of respondents (96%) were female and aged over 40 years (82%). Almost half were ENs (47%, approximately one third of these had medication endorsement), 27% were RNs and 22% were PCAs. Most respondents had worked in the sector for more than ten years, with ENs without medication endorsement having the longest employment (mean = 18 years) and PCA the least (mean = 10.5 years).

Mean score in ADKnowledge questionnaire by position

Table 1 compares the scores of participants by different professional groupings (RN, EN, PCA) and indicates that almost three quarters of the group were either RNs or ENs. RNs performed better than any other group in the questionnaires with an average score of 74.1%, followed by ENs with medication endorsement who scored 67.3%. RNs tended to have greater knowledge compared to the ENs and PCAs. However, the difference between the knowledge of the RNs and ENs was not significant.

Specific medication questions

Twelve questions related to specifically to medication administration. In all questions more than 50% of respondents nominated the incorrect answer or indicated they did not know. One vignette described a scenario where a resident had been vomiting and most

respondents did not answer the questions correctly (Table 3). The highest correct score obtained was 45.6% in an item about crushing Oral Hypoglycaemic Agents (OHA). This item also showed a difference between RNs and ENs, where RNs were more likely to answer correctly. These results show similar responses to other medication questions, namely that the correct response rates were inadequate and when added to the 'don't know' responses raises questions about the quality care available to residents with diabetes living in these settings. This is concerning given that insulin is a high risk medicine and can have significant side effects especially in vulnerable older people, even when it is administered as prescribed.

The qualitative data obtained in the focus group interviews and from the qualitative comments section of the questionnaire identified four themes relating to optimal medication administration for residents with diabetes. These were communication, resident characteristics, time and knowledge about diabetes care and are presented in table 3.

The lack of time and the timing (around meal times) was the most prominent barrier for accurately and timely medication administration. Both organisations used a model of the senior nurse on duty administering drugs to all residents in the unit using a medication trolley to dispense medicines from individualised pre-packaged blister drug packs. Staff indicated it was very difficult to balance managing medication rounds and the competing responsibilities, which meant medicine administration was constantly disrupted. Additionally, assisting residents to swallow medication and encouraging residents who refused to take medications delayed medication rounds. Consequently, staff felt medication administration was big responsibility and was stressful for them. One participant said:

You have to mix that [medication] up and you got difficult residents who don't want to take [medication] – it takes time. You got 30 people, you got to give Warfarin, you got to give all the DDs [dangerous drugs] and

everything and it is a big responsibility for one person [med endorsed
ENs - focus group]

Participants listed issues/factors that made it challenging for them to manage the care of people with diabetes, which are summarised in table 3. The amount of time taken to administer medicines was a major challenge as illustrated in the following quote:

You should see the amount of medication some of them have, too. It takes a long time. We think – it is no good because they start at half-past three giving out afternoon pills and they finished at six o'clock

[RN from focus group interview]

Knowledge deficits about glucose lowering medicines (GLM) were evident as were aspects of managing insulin, what glycosylated haemoglobin (HbA_{1c}) levels indicate, and diabetes comorbidities. Not unexpectedly, RNs achieved higher average knowledge scores of 74.3% compared to ENs and PCAs who both scored 49%.

Case file audit

The findings of the case file audit showed the government mandated documentation requirements, together with a combination of electronic and paper- based recording systems fragmented information and made it difficult to understand the care delivered to residents.

No consistency was identified in the case files about blood glucose monitoring or the regularity in HbA_{1c} monitoring in either organisation.

General practitioners (GPs) provided medical care to residents in both organisations; it was evident that individual GPs had different approaches to managing diabetes in older people. The regularity of GP visits to residents varied from monthly to three monthly. In one case, the resident was visited by a number of GPs from a group practice and there was a note in

the file indicating GPs were unwilling to change medications because they were not the 'main' GP.

Polypharmacy, the concomitant use of five or more medicines (Viktil *et al.* 2007), was evident in most of the case files. Some residents were prescribed as many as 16 different medicines. There was no documented regular pattern of medicines review: residents' records showed one to three monthly reviews by their GP. A small number of records indicated a pharmacist review, which is interesting given that medications in both organisations are prepacked by a pharmacist service.

Wilson *et al.* (2010) in a recent review of medication safety in RACF identified these environments as unique (Wilson *et al.* 2010). Residents are at greater risk of medication errors because of their reduced autonomy, together with a complex interplay of factors that alter medicine pharmacokinetics and pharmacodynamics and affect optimal medicine doses and dose intervals. In the context of limited medical support and poor knowledge among RACF staff, the introduction of regular interdisciplinary team reviews of medications that includes a pharmacist could reduce the potential for medication errors (Wilson *et al.* 2010).

Discussion

The findings highlight the challenges associated with managing diabetes in older people living in residential aged care settings. The current study suggests administering medicine to residents in RACF is difficult, and has potentially serious medical, professional and economic consequences. Mixed methodology was chosen to mitigate the anticipated challenges in data collection; triangulation of data sources provided a mechanism to substantiate the findings, given the small sample size. However, these findings are limited to the study settings but they provide insight into the range of issues staff in RACF may encounter when caring for residents with diabetes.

There were clearly limitations to staff knowledge of contemporary diabetes care and medications, which potentially places residents with diabetes at risk of receiving less than optimal diabetes care. Low levels of diabetes-related health literacy have been acknowledged by Diabetes Australia (2010) who recommended there should be a national diabetes training standard that all staff in RACF need to fulfil (Diabetes Australia National Policy Priorities 2010).

The current findings raise questions about the overall health literacy of staff in RACF, and, with the increased reliance on a staffing mix that has a significant proportion of unregulated workers, there is an urgent need to further investigate staff knowledge about the medication-related issues affecting residents. This is supported by studies in the US showing paid carers for older people have inadequate health literacy (Lindquist *et al.* 2011, Sudore & Covinsky 2011).

Differing approaches by GPs and variable review of prescribed medications increased staff uncertainty about caring for residents. Other researchers noted GP shortages in regional and rural settings (Unger *et al.* 2011), which could contribute to the inconsistent medical support available to RACF staff who need greater access to expert medical support for residents with diabetes. In Australia there is a 52% shortfall in GP availability for RACFs and poor remuneration contributes to GPs regarding resident care as unattractive (Gadzhanova & Reed 2007).

Fragmentation of documentation may also contribute to poor quality of care. Gershater *et al* (2010) suggested improved documentation should include a structure of planning, performing and evaluating metabolic control (blood glucose measurements, Hba1c, weight and nutrition status) (Gershater *et al* 2010). Electronic documentation is currently being introduced in both organisations, but has been hampered by poor staff training and limited infrastructure. Other researchers have reported similar findings (Loh *et al.* 2009), and there

is a clear need for initial and ongoing education to support staff to use technology in aged care settings.

Garcia and Brown (2011) found that staff did not follow clinical practice guidelines in an international systematic review focused on RACF(Garcia & Brown 2011). However, our study, although clearly identifying a lack of diabetes-specific guidelines, also highlights the complexity of care and the need in Australia for specific guidelines about caring for older people with diabetes in RACF. The lack of guidelines specific to older people in RACF settings suggests an assumption that the issues for older people with diabetes are independent of context. There is an urgent need to provide guidance for RACF staff about how to support residents with diabetes. This may assist staff who face unpredictable resident behaviours such as refusing to take medicines, which are barriers to administering medication accurately and timely.

In the current study, qualitative data about administering diabetes medicines indicated that lack of time, as well as, the timing (around meal times, which are busy times for staff) were prominent barriers to administering medicines. The staff found it very difficult to balance correct medicine administration and other duties, particularly because medication rounds clash with meal times and some residents did not want to take their medicines, which delayed the medication rounds. The traditional approach to administering medicines where one nurse undertakes the medicine round may contribute to the problems. With increased numbers of ENs skilled and endorsed to give medication, it could be advantageous to move to a decentralised bed-based medicine administration system.

Conclusion

This study showed that staff involved in caring for residents with diabetes had suboptimal knowledge and poor health literacy about medicines to safely and accurately administer diabetes medicines such as GLM especially insulin. System issues and unpredictable

resident behaviours contributed to the difficulty staff had administering medicines and resulted in nurse stress.

Understanding barriers and facilitators to administering diabetes medication in RACFs indicates a need for interventions to build staff capacity to deliver safe diabetes care and reduce diabetes complications. Providing evidence based guidelines about diabetes care in residential care settings is essential to achieve acceptable outcomes and increase the quality of life for residents in public aged care. Continuing education programs in diabetes care, specifically related to medication must be provided to all health professionals and encompass scope of practice. 'Tailor-made' education programs should be designed to meet the learning needs of each group of carers, because the current skill mix among carers have distinctively different learning needs. More research is needed to determine how RACF staff medication knowledge affects the care of residents in RACF.

Contributions:

Study Design: SW, TD, BR:

Data Collection and Analysis SW, TD, BR, SS

Manuscript Preparation SW, TD, BR

Conflicts of Interest: nil

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Table One : Mean score in ADKnowl questionnaire by position

Position	n	Mean Score (%)
Registered nurse (RN)	18	74.31
Enrolled nurse (EN) with medication endorsement	11	67.32
Enrolled nurse (EN) without endorsement	21	58.28
Patient care attendants (PCA)	15	54.88
Other	3	47.42

Table 2 Specific Medication Questions

Description:	True	False	Don't know or missing
75 yr old with type 2, takes OHAs, has vomited overnight. Would you...			
Administer her OHA meds as prescribed	30.9% (correct)	26.5% (incorrect)	42.6%
Administer her OHA meds before breakfast	7.4% (correct)	42.6% (incorrect)	50%
Crush her OHAs to make them easier to swallow	45.6% (correct)	4.4% (incorrect)	38.2%
If you are ill and not eating, it is advisable to take less long-acting (background) insulin	20.6% (incorrect)	26.5% (correct)	35.3%
If you are ill and not eating you may need additional quick-acting insulin	29.4% (correct)	23.5% (incorrect)	32.8%

Table 3 **Qualitative Themes: medicine administration**

<p>Communication:</p> <p>poor handovers</p> <p>unclear communication processes</p> <p>differing opinions of GPs</p> <p>lack of continuity of care</p> <p>lack of flow of information</p> <p>gaps in patient medical history</p>	<p>Resident Characteristics</p> <p>long term health issues</p> <p>polypharmacy concerns</p> <p>patients' financial situation</p> <p>understanding patients' medication regimens</p> <p>patients refusing meals</p> <p>patients with dementia</p> <p>patients refusing medication</p>
<p>Time</p> <p>lack of time</p> <p>schedule for resident meals; morning & afternoon teas</p> <p>visitors disruption</p>	<p>Knowledge about diabetes care</p> <p>lack of education (for nursing staff)</p> <p>lack or different levels of staff knowledge administering GLMs</p> <p>what HbA_{1c} levels indicate</p>